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Arbor Day Number

School Days in the Woods

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Each year an increasing number of teachers with their boys and girls are enjoying school days in the woods. These school journeys can be made red-letter days for both the teachers and their pupils. For the best results, each school journey should be arranged with a special objective, that is, a particular place to visit, a definite object to see or a special thing to do. Well-planned school journeys are usually interesting from the start and move forward on a higher level than mere outings.

It is fair to assume that on some of these school journeys the forest will be the laboratory and the trees, shrubs, flowers, ferns, birds and other wild things the textbooks. All of these subjects and many others offer suitable material for a school journey. One subject to which boys and girls have responded favorably on these school journeys is "What a forest is." The right way to find out what a forest really is, is to go into the forest and there begin a first-hand acquaintance with some of the many members of the forest family. It is a mistake to try to become acquainted with all the members of the big forest family on the first trip to the woods, just as it would be impossible to become acquainted with all the inhabitants of a city in one day.

A practical plan for the first school journey to the woods is to make a list of all the different plant and animal groups that are seen on the trip. This can be done by making a table with two columns, one headed "Plants" and the other headed "Animals." Then the teacher may direct each pupil to list under each of the two columns the different kinds of plant groups and animal groups observed on the trip. Under the column with the heading "Plants" can be recorded such names as trees, shrubs, mosses, lichens, liverworts and toadstools. Under the column "Animals" can be recorded birds, squirrels, rabbits, insects, turtles, lizards and snakes. Above all else this exercise will show that a forest is much more than a collection of trees lifting their crowns toward the sky. Instead, it will show that it is truly a complex community of living things.

Interest will be added to this project if the pupils are asked to tell how each of the groups listed touches our everyday life, that is, tell how trees serve us, what shrubs give us, how ferns help us, what birds mean to us, and why the deer is of interest to us. At first this exercise may seem very general in nature and of little importance, but if conducted properly it will unfold to the pupils the big world of living things as found in the forest, and this is truly worth while.

For a second school journey it will be interesting to consider one of the plant or animal groups more in detail. For example, trees may be selected as the principal topic for consideration. At first the teacher may find it difficult to decide where to study the trees. If one lives in a big city and can not go into the woods, the trees along the streets or in the parks can be studied. Small woodlots, fence rows, banks of streams, abandoned fields are all good places. But the best place of all is in the woods.

Nature was in a generous mood when she developed the forest flora of the Empire State, for by careful study it has been found that there are more than 100 different native trees growing within her borders. To become acquainted with all these trees is no little task. A good way to begin is to get acquainted with about ten different trees on each trip to the woods. Supplied with a good tree handbook, the teacher and pupils may go into the woods and collect leaves, for the leaves are often the best and easiest means by which trees can be identified. In winter it is possible to collect twigs with their buds, but then identification is more difficult. Many teachers have found it helpful to place the leaves between the pages of their handbooks just opposite the description of the tree they believe it to be. After the leaves of ten trees have been identified correctly the teacher can list them, and then test the pupils to find out if they really know them.

After giving the most striking distinguishing characteristics of each tree, it is often interesting to tell how each tree contributes to our everyday life. If one of the collected leaves

A Thrifty Plantation of Red Pine Ten Years after Planting

happens to be that of a sugar maple, it will be of interest to tell how the sugar maple is tapped in the springtime and its sap made into maple syrup and maple sugar. If another of the collected leaves is from the sweet or black birch, it will be interesting to tell how the oil that is distilled from its bark is used in medicine and in flavoring wintergreen candy. If another chances to be hemlock, it will be worth while to tell how its bark is peeled, taken to the tannery, and there used in the tanning of leather that finds its way into the shoes of everyday use.

Additional school journeys may be devoted to a further study of trees and other closely related subjects. Among the subjects that suggest themselves are:

1 *A trip to the biggest tree in the county in which your school is located.* If the biggest tree in the county is not known, an interesting contest can be arranged to locate and describe it. Someone may be willing to offer an attractive prize for the winner of the contest.

2 *A trip to a historic tree, or some other tree or tree group of unusual interest.*

3 *A trip to some important tree place,* such as a botanical garden, an arboretum, or a grove of primeval trees.

4 *A trip to a forest tree nursery,* in which trees are grown from seed to a size suitable for reforestation work. The State of New York now operates six forest tree nurseries located at Saratoga Springs (the largest), Lowville, Lake Clear, Horseheads, Painted Post and Tully. According to the latest inventory, there are almost 147,000,000 trees growing in these six nurseries, and any one of them is worthy of a school journey.

5 *A trip to a state reforestation area.* Since 1929, reforestation areas have been acquired by the State. With the completion of reforestation work in the spring of 1932, a total of 61,349 acres were included within the reforestation areas, and upon them almost 50,000,000 trees have been planted. They are distributed widely throughout the State and will serve as interesting and worth while objectives for school journeys. Any of the ten district foresters of the State, with headquarters at Oneonta,

The School Boys and Girls of Switzerland Have Helped Develop Many Forests of Spruce and Beech

Norwich, Cortland, Bath, Jamestown, Lowville, Canton, Herkimer, Hudson Falls and Fleischmanns, will help locate a reforestation area that is suitable as to location and condition for a school journey.

6 *A trip to a noteworthy forest tree plantation.* This project offers an unusual opportunity to teachers and pupils of New York, for scattered throughout the State are hundreds of plantations of special educational value. Some of them are already among the finest in our country and in time will develop into forests that will take their place among the great forests of the world. A considerable number of forest tree plantations have been established by schools and colleges, some of them containing as many as 86,000 trees. As early as 1920, school forests were established in New York and since then as many as 200,000 trees a year have been planted, and during the last five years a total of almost 750,000 trees have been planted by schools for reforestation purposes.

When to take these school journeys to the woods is a common question. Experience has shown that the most appropriate day is Arbor Day, which means Tree Day. It was instituted 61 years ago by a small group of enthusiastic tree lovers in Nebraska and is now observed in every state of the Union. It is a special day set aside for the development of a better appreciation and fuller understanding of the importance, value and services of our trees and forests.

Just as the school children of Switzerland and other European countries have helped plant and protect some of the forests that are now among the most famous of the world, so it is truly probable that among the forest tree plantations established by and belonging to the school children of New York, there will develop some that in time will be rated among the great forests of the Empire State. And when we plant trees, we will do well to think with Henry van Dyke that

> He that planteth a tree is a servant of God.
> He provideth a kindness for many generations,
> And faces that he hath not seen shall bless him.

That reforestation is an urgent social and economic necessity is now an accepted fact.

Where once we had unbroken stretches of wondrous woods, we now have vast areas of waste land or greatly deteriorated forests. To face the task of restoring this land to production is a duty, both urgent and practical. It is our duty to plant where God once planted, and by careful and conserving concern we can restore to our hills and valleys the essential good that trees secure to us and those who will follow after us. Our children need not fear the future if we do our part in our day wisely and well.

Ghost Plants

BY ELSIE GIBSON WHITNEY, ASSISTANT STATE BOTANIST, NEW YORK STATE MUSEUM

The joy of release from the cold and snows of our northern winter finds expression for many of us in exploring the fields and woods for early signs of reawakening life. Such exploring may be simply visits to areas already well-known and familiar through long association, to check the first appearance of spring flowers against the records for other springs, or there may be adventures farther afield to some, for us, unvisited territory, holding all the alluring possibilities of discovery in any strange land.

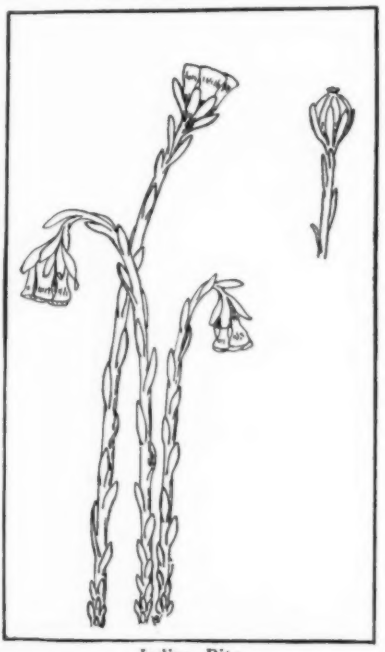
If such spring explorations include an area of open pine and mixed hardwood forest we are almost sure to come upon one or several scattered clumps of stiffly upright brownish stems, each bearing a small, almost round seed pod, shaped like a miniature pumpkin with lengthwise creases down the sides and partly open chinks through which the seeds have escaped. Sometimes inspection shows that a few of the very small, winged seeds have been retained over the winter. If all the seeds were as tiny as these specks we find, what a host of them the seed pod must have contained! And how is it possible for such mere particles to develop new plants!

To one initiated in the ways of the wood this dried and stiff stalk brings to mind a very different picture than the scene before the eyes — one something like this perhaps:

On a hot afternoon in the latter part of July a golf ball had decided to play truant and what had seemed hours of searching in the relentless sun had failed to find it. So, weary and disgusted, the golfer wandered a short distance into the cool wood neighboring the golf course and there threw himself down on the withered grass and scattered pine needles to cool off and rest. But no sooner had he settled himself comfortably on the ground than his eye fell on a strange apparition just at hand. Pushing up through a cover of grass, leaves and pine needles were a dozen or more white stalks six to ten inches high; some apparently fully developed and others just pushing through the cover with their flower heads bent over quite double, but all that could be seen of the whole assemblage looking as if carved out of crystalline wax.

By now you have rightly guessed that this strange object is the Indian pipe or ghost plant (*Monotropa uniflora*), one of a curious group whose members develop no green leaves and therefore are unable to manufacture their food by the usual plant method. The members of this family, *Monotropaceae*, are all saprophytes, getting their food from surrounding plant material which is still in the process of decay. The underground part, as is general in saprophytes, is a more or less rounded mass, from one to several inches in diameter, composed of very much branched and interlaced, corallike roots, covered with a root fungus by whose aid absorption of food materials from the surrounding humus is possible.

In due time directly upon these short and stubby roots adventitious buds are formed, and at length develop into the flowering stalks which push up through the blanket of soil and leaves. Numerous bracts or scales along the stem indicate the places where leaves would have



Indian Pipe

developed if the plants were normal chlorophyll-green ones. But in Indian pipe these bracts and the stem, as well as all the parts of the flower which terminates it, are waxy white in color, varying in some plants to a flesh pink, or, occasionally, to quite red. A half-translucent quality, very evident if the stalks are seen against the sunlight, reminds one of alabaster.

As each stalk grows to maturity the single recurved, somewhat bell-shaped flower gradually becomes erect, tardily the petals fall off, and finally the whole stalk blackens and dries, at length weathering to the brownish dried stalks found after the winter's snows. Occasionally last season's dead stalks persist, so that they are present beside the brilliantly fresh new growth of late summer.

The number of stalks developed from a single root-mass varies greatly, from two or three to commonly 15 or 20, depending perhaps on the amount of moisture in the soil, or the vigor of the symbiotic fungus, or in part, possibly, on the age of the plant. One of the largest clumps of which there is record displayed about 150 stalks and measured 14 inches in diameter.

This curious member of the plant kingdom may be found under various kinds of trees, but more frequently among conifers; and although it is distributed in somewhat local areas from Newfoundland to British Columbia and southward to Florida and Mexico, it is most numerous in northeastern United States and becomes a rare plant on the Pacific slope.

Two other representatives of this family are found in our region. Pine sap (*Monotropa Hypopitys*) is one of the common names for a plant so closely related to Indian pipe that it is usually included in the same genus, although it is sometimes given separate generic rank as *hypopitys lanuginosa*. This plant at once proclaims its close relationship to Indian pipe, for although its color is a light brownish yellow sometimes running into the reddish shades, the clustered stems and shape of the flowers place it at once. Pine sap has several flowers on each stem, and the individual blossoms are smaller but they have the same habit of straightening upright on the stalk at maturity from the doubled-over position in which they push up through the duff.

These two plants are often found growing near each other, and if pine sap seems to be not so striking an object in its surroundings as the white stalks of Indian pipe, it makes up for this loss by possessing a delightful musky-violet odor only occasionally faintly present in its paler relative. This fragrance seems to be in all parts of the plant and not in the flowers only; it is possible that it is associated with the fine hairs that cover the whole plant. And it persists long after the stalks have been pressed and dried.

The third member of this family found in northeastern America is *Pterospora andromedea*. Its common name, "pine drops," indicates again how generally these plants are associated with pine trees. *Pterospora* is the big brother in this group. Its stout stem is usually 15 to 20 inches tall, and in some cases reaches a height of three feet. The flowers are borne on the upper half of this stalk, numerous nodding little bells about the size and shape of the individual flowers of lily of the valley. The corolla is creamy yellow, but all the rest of the plant — stem, bracts, petioles and calyx — is a vivid brownish purple, making it a most striking object wherever found. All the parts except the corolla are thickly covered with sticky, glandular hairs, but they seem not to carry any odor comparable to that of pine sap.

Older records indicate that formerly this plant was much more common than it is today. For now it is truly a red-letter day when one discovers it growing within our borders. Let us hope that the replanting to forest trees of a million "idle acres" in our State will eventually provide conditions that will encourage these unique and beautiful flowers to return in numbers even surpassing their former abundance.

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The year's at the spring,
And day's at the morn;
Morning's at seven;
The hillside's dew-pearled,
The lark's on the wing;
The snail's on the thorn;
God's in his heaven —
All's right with the world!

— Robert Browning.

The University of the State of NewYork Bulletin to the Schools

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CHARLES F. PROBES, *Editor*

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APRIL 1, 1933

Arbor Day Dates

The dates of April 21st, April 28th and May 5th have been designated by Commissioner of Education Frank P. Graves for the observance of Arbor Day in this State. In his Arbor Day proclamation, printed in the March 1st issue of the Bulletin, Commissioner Graves recommended that local authorities determine which of these dates be used.

Assistance in the preparation of this issue of the Bulletin was given by the New York State Museum, of which Dr Charles C. Adams is Director. The appreciation of the Editor is expressed to him, to the office of the State Botanist and to the contributors.

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The Part of Good Citizens

A people without children would face a hopeless future; a country without trees is almost as hopeless; forests which are so used that they can not renew themselves will soon vanish, and with them all their benefits. A true forest is not merely a storehouse full of wood, but, as it were, a factory of wood, and at the same time a reservoir of water. When you help to preserve our forest or to plant new ones you are acting the part of good citizens. The value of forestry deserves, therefore, to be taught in the schools, which aim to make good citizens of you. If your Arbor Day exercises help you to realize what benefits each one of you receives from the forests, and how by your assistance these benefits may continue, they will serve a good end.— THEODORE ROOSEVELT, 1907

Wild Flower and Bird Books and Plates Are Available

The State Education Department still has available a number of the New York State Museum memoir on Wild Flowers of New York and also portfolios of the wild flower plates. The memoir is in two volumes and contains 264 colored prints in addition to numerous photographic illustrations and also descriptions of more than 400 of the most conspicuous wild flowers of the State. Included in the introduction is a chapter on the structure of the plants with particular reference to flowers and leaves. The author is Dr Homer D. House, State Botanist of the State Museum.

The two volumes are sold for $7 with shipping charges paid within New York State. The two volumes weigh 14 pounds. The portfolio of the 264 plates is sold for $2.50 plus postage. The portfolio weighs five pounds.

The Department also has copies of the Museum memoir on Birds of New York. Volume 1 is devoted to the water and game birds, and contains besides 150 pages of tables showing distribution by counties, and migration lists, 390 pages of text and 42 colored plates. A number of maps show the range of certain species, and charts illustrate the distribution of species breeding in various life zones. Many text cuts reproduce photographs of birds, their nests, eggs and young.

Volume 2 treats of the land birds, and begins with chapters on the ecology of birds or the relation of birds to their environment. In this volume there are 443 plates of text and 63 colored plates, besides numerous photographic text figures.

Altogether 411 species are described, and their habits, ecologic relations, distribution and economic importance are discussed. The text is by Professor Elon H. Eaton of Hobart College and the colored plates by Louis Agassiz Fuertes.

The two volumes are sold for $6, plus transportation charges. The two volumes weigh 15 pounds.

There is also issued in portfolio form a set of the 106 colored plates published in the two volumes of the Birds of New York. This set of plates is sold at $1.20 postpaid (to Canada $1.40).

Orders must be accompanied by remittance made payable to the New York State Education Department.

Turning Abandoned Farms into Production Forests

BY JOHN T. GIBBS, SECRETARY, NEW YORK STATE CONSERVATION DEPARTMENT

Dotting the New York landscape today are hundreds, perhaps thousands, of abandoned farms. Tourists speeding along the main highways seldom see these fallen-in houses, these ramshackle barns or these weedy and scrubby acres because they usually lie in the highlands on side roads. Town and county authorities all over the State, however, are acutely aware of their presence. Their owners have moved away and no longer pay taxes. In most instances the county does not seize the property because it is regarded as nearly worthless. So, in the richest and most populous State in the Union there are actually several millions of acres of land which once supported families and produced food but are now regarded as unfit for human habitation or unworthy of the expenditure of human labor.

It seems strange that land which in the days of hand tilling was able to produce enough to keep a family thriving should, in these days of easier fertilization and machine farming, be contemptuously tossed aside, but the explanation is easy. When the first settlers from England and Holland landed on these shores, they found the land heavily wooded. It was necessary for them to cut down trees in order to get land upon which to grow food. Although this land was not especially good, it was all they had, as they did not penetrate very deeply into the country. It was centuries later before the West was opened. The vast lands in the Mississippi valley and on the open prairies still farther west were immensely richer than the average soil in the cut-over Eastern areas. Many who were tired of breaking their backs coaxing a precarious living out of the stony and stubbly acres of the East went West, leaving their land behind them to grow to weeds. Then the railroads began to bring the rich products of the West to the Eastern markets and it became increasingly difficult for our farmers to compete. Who can make a living raising one unit on one acre when someone else is able to raise ten units on an equal area? So the second abandonment of farms began and has continued to the present time.

These abandoned farms have long constituted a problem in the State, but little or nothing was done about it until another problem arose, seemingly different but actually quite similar. This was the problem of our disappearing forests. The first settlers cut down trees to make farmland. Later came the lumbermen, who cut down trees for wood and pulp. The supply seemed inexhaustible, so the woodsmen hewed and hacked recklessly until they had denuded vast areas. Villages which had been established for lumbermen had to be abandoned because all the desirable wood in their vicinity had been cut and the land was too poor or remote to be fit for farming. Hence, there was another abandoned area in the State in addition to the farms.

Worse than this, an industry was rapidly diminishing and the State's water sources were threatened, because trees in large numbers constitute an important factor in conserving the water supply, keeping streams within their banks and preventing floods and drought.

The problem of our disappearing forests was attacked long before any solution of the abandoned farm dilemma was sought. Early in the twentieth century the State of New York determined to preserve what was left of its depleted forests and to add to them. It set up the Forest Preserve by drawing lines on the map of the State around the Adirondack and Catskill mountains and beginning the purchase of land within these areas. At the same time the State set up forest tree nurseries and started to replant those areas in the preserve which had been denuded.

Today, after a generation of purchase and planting, the State owns 2,300,000 acres of land in the preserve and nearly all of it is heavily wooded. By constitutional provision, this land is kept forever inviolate as wild forest. Not a tree may be cut except for protection of the forest itself in case of pest or fire or for the construction of a few specified roads through its extent. At least New York's mountain forests have been preserved and rebuilt.

As this accomplishment was nearing a point where it could be pronounced successful, the attention of conservationists was turned from abandoned lumbering camps and directed toward abandoned farms. Merely to have trees in the mountains was not enough. Why not have trees in the lower hills and on level land as

Courtesy of Conservation Department

Crew of Men Planting Trees on an Abandoned Farm

well? Where should these trees be planted? The answer was ready at hand — on the abandoned farms. These lands had once grown trees and the soil was fitted for such growth. It was obviously unfit for farming because farmers had abandoned it.

After long investigation by a Reforestation Commission, the State adopted a policy of reforesting idle acres. The complete program may be summed up in the following table:

Year	*Acres to be acquired*	*Acres to be reforested*	*Appropriation necessary*
1930.....	40 000	10 000	$ 400 000*
1931.....	50 000	15 000	600 000*
1932.....	50 000	20 000	1 000 000*
1933.....	60 000	30 000	1 200 000
1934.....	100 000	40 000	1 400 000
1935.....	100 000	50 000	1 600 000
1936.....	100 000	60 000	1 800 000
1937.....	100 000	70 000	2 000 000
1938.....	100 000	80 000	2 000 000
1939.....	100 000	90 000	2 000 000
1940.....	100 000	100 000	2 000 000
1941.....	100 000	100 000	2 000 000
1942.....	.....	100 000	2 000 000
1943.....	.....	100 000	.....
1944.....	.....	133 000	.....
	1 000 000	998 000	$20 000 000

* Funds already appropriated.

In order that this program might be effective and uninterrupted, it was necessary that the funds each year should be assured. Therefore, after appropriating $400,000 in 1930 and $600,000 in 1931, the Legislature submitted to the people a constitutional amendment making it mandatory on the Legislature to appropriate the remaining amounts up to 1942. The people adopted this amendment and it is now the supreme law of the State. There can be no interruption of this 15-year program, now entering upon its fourth year.

The Conservation Department was intrusted with the duty of carrying out this program and definite quotas were set for the department to accomplish each year. Under the program schedule, the department was required to acquire for the State in the first three years 140,000

acres. At the end of 1932, it had actually purchased or had under contract more than 200,000 acres, thereby exceeding its quota by 60,000 acres.

The program called for the reforesting of 45,000 acres by the end of 1932. At that time the Conservation Department had actually reforested 61,325 acres, or 16,000 more than its quota. During 1932 it had reforested 27,000 acres, or 7000 more than its quota for the year.

The 1933 program calls for the acquisition of 60,000 acres, which are already contracted for, and the planting of 35,000 acres. This may easily be exceeded if the department wants to keep so far ahead of its program, because the State's tree nurseries have ample stock to proceed with the planting of considerably more than 35,000 acres this year.

In approaching this 15-year task the department had to plan far ahead. First of all, it had to have little trees in quantities sufficient to reforest very large acreages. This was accomplished by extending and concentrating work on the State's existing nurseries and by acquiring new land for nurseries. The State now owns at Saratoga Springs the largest nursery in the world. It had four others when the program started and has since acquired a sixth at Tully, which will get into production this year. Still another is planned as the program expands further.

Next, land had to be purchased. Many offers of land were made. A policy was adopted of not paying more than $4 an acre for any land to be reforested, as most of this land had been abandoned and was regarded as nearly worthless. Actually, the average price paid to date is $3.88 an acre. Not all the land acquired had been abandoned. Many farmers still held poor land, intending to abandon it but not knowing what to do if they did move away from their old neighborhoods, as they had no money. Purchase of such lands by the State gave the farmers a little stake.

After the planting of little trees, the State was obliged to protect its new plantations from

Courtesy of Conservation Department

A Reforested Area Showing White and Scotch Pines 25 Years Old on Land Which Was Once Bare of Trees

fire, tree diseases and pests. For fire protection the Department divides all its reforested area into plots of approximately 50 acres, around each of which it plows a lane four furrows wide over which fire in young trees could not leap. The value of this is known, but in truth it has not been tested on New York's reforestation areas because not a single acre of new planted land has been destroyed by fire in the three years of the program.

It is necessary also to protect these new areas from a number of tree diseases, one of which, the white pine blister rust, has been ravaging large areas of the State for some years. To give the new plantations a good chance of survival, all plants which act as hosts to the blister rust germ have been removed from all reforestation areas.

The reforestation program is moving along smoothly with every indication that, barring unforeseen accidents, it will be completed on time and even ahead of time. Its operation in 1932 gave work to 10,000 extra men in the field and in the nurseries, and probably to a 1000 more in clearing up the areas after reforestation, thereby contributing to some extent to unemployment relief. It will bring considerably more of such relief this year.

While the reforestation program is by far the greatest tree planting effort in New York, it is by no means the only one. In addition to planting trees on abandoned farm areas, the State also maintains an ever-increasing area of forested land in the Forest Preserve proper, planting hundreds of thousands of trees within the preserve each year. From the state nurseries also are sent forth millions of trees to counties that operate county forests, cities that reforest their park areas, water districts that place trees around their reservoirs, schools and colleges that maintain their own forests, game clubs that set up private woodlands, Boy Scouts and other organizations that establish small forests and thousands of individual estate owners and farmers who add to the wooded areas on their property.

In 1931, for instance, 41,211,878 trees were distributed from the state nurseries, of which only a little more than half — 22,318,954 — were planted on state land, the remainder being distributed to municipalities, organizations and individuals. In 1932 the proportion of state nursery trees going to state-owned areas was naturally much higher, as 1932 was the first really big year of the reforestation program, but there continues to be a vast amount of tree planting in the State each year, in addition to the State's own reforesting.

Just what return does the State of New York receive for all this expenditure of money and effort?

The gains to the State are intangible, but very real, right now, although in later years some tangible and profitable returns may be expected.

Now the State is gaining by placing a larger amount of public land at the disposal of its sportsmen and vacationists. Every reforestation area is a public hunting and fishing ground, and this is important, because nearly all areas purchased are along running streams or lakes.

Also the local community gains immediately by receiving the local taxes that the State pays on this land. In many instances the abandoned farms had paid no taxes for years, but the county could not seize them because it could not sell them to anyone; consequently it lost its taxes.

With the extension of reforestation areas into large pieces, the counties may abandon roads leading to some small settlements which are to be eliminated, thereby saving road upkeep. The same may apply to some extent to small rural schools, which were being run at too high an expense for a very few pupils. Useless telephone, telegraph and electric current lines may also be abandoned, effecting a saving for utilities.

A more important immediate effect is the assurance that the flow of many small streams may be assured a certain constancy by reforestation. It is believed that trees prevent floods and conserve water supply. Tests to prove this have been begun in the reforestation areas. A large number of streams will be tested for a number of years and the result will settle a dispute over this factor which has been raging among foresters and engineers for many years.

Ultimate benefits are many and varied. First, there is the assurance of a future timber supply. With a million acres planted with trees, New York need have little fear of being entirely without wood in the future. In about 30 years these trees planted now will mature. When that time arrives, the State may arrange with lumbering companies for thinning out, the State to receive cash for the privilege of allowing the companies to cut. Immediately after

cutting, these areas will be reforested in a scientific manner, thus assuring a continuance of the supply—a thing never dreamed of by old lumbermen.

Reforestation has another ultimate benefit of supreme importance. This was mentioned a number of times by President Roosevelt in his speeches as Governor explaining New York's program. It is common knowledge that agriculture since the war has suffered from overproduction. To ask farmers to curtail their individual crops, especially if their land is fertile, is absurd. It is not absurd, however, to remove land that is unfit for crops from competition with better soils.

That is exactly what reforestation is doing and will do in increasing measure as it is adopted by other states. It takes poor land out of agricultural circulation, thereby reducing the overproduction in the most sensible way, making more valuable the good land and giving the farmers a better price for products raised on this good land.

Reforestation, therefore, is something that may be applied nationally as a permanent step toward partial solution of the Nation's vexing farm problem. As in other lines of governmental activity, the State of New York is pointing the way to the rest of the Nation.

Forest Fires and Their Prevention

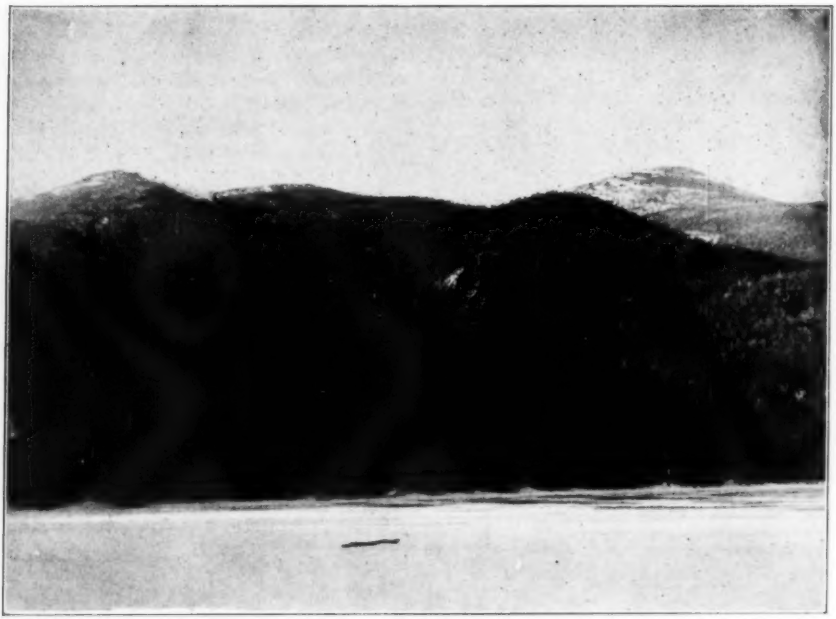
BY K. F. WILLIAMS, SUPERINTENDENT FOREST FIRE CONTROL, NEW YORK STATE CONSERVATION DEPARTMENT

The origin of Arbor Day and the rapid spread of its observance throughout the Nation is an intensely interesting story. Here it is necessary to state only that the day now observed in New York State was set aside by legislative enactment in 1889 to encourage "the planting, protection and preservation of trees and shrubs." The foundation stone upon which the structure of Arbor Day was erected was the rapid depletion of our original forested areas. Forests are a renewable resource and under normal conditions where cut off will again produce valuable crops of trees. Except where forested areas have been intentionally reduced, as for example the liberation of land for agricultural purposes, one important factor, forest fires, has caused the diminution in the extent and quality of our forests. That which could not be accomplished with ax and saw has resulted from carelessness in the use of fire in the open.

You are familiar with the important relation of forests to a community. Forest fires destroy the raw products upon which many industries are dependent, ruin scenery and destroy the water-retaining qualities of the soil. Destruction of forests has an undesirable effect on climate. Fish and game are missing in areas that have suffered from severe fires. In fact, all the beneficial values derived from woodlands are consumed in the flames that leave only areas of barren rock as mute witness to the permanent destructiveness of fire. The control of forest fires is therefore a necessary national policy, and the combined efforts of federal and state governments, ably assisted by private organizations, are extended to reduce the menace from fire.

Progress has been made in reducing annual forest fire losses. For example, during 1908 nearly 500,000 acres of forest land were burned in New York State with a loss approaching $1,000,000. The annual loss during the past five years has averaged less than 3500 acres in the same area. Forest fires do not assume destructive proportions immediately upon inception. Usually the disastrous fire has been neglected during its early stages and has attained such magnitude that under certain conditions no human agency can check its progress. At the beginning, fires with rare exceptions are "surface fires." These are the most frequent in New York State and the most easily suppressed. Surface fires develop into "crown fires" and "ground fires," the former of a most destructive character. Ground fires are restricted in area, and as the name implies, burn into and consume the soil.

Crown fires are those consuming the entire crown or leaf-bearing part of the tree. These fires occur most frequently in softwood or coniferous stands, although they may burn through hardwoods. Lacking considerable amounts of inflammable material on the ground



Courtesy of Conservation Department

These Mountains Have Been Free from Forest Fires

and a high wind, such fires seldom start, and will stop through lack of either factor. Such a fire spreads with great velocity. The strong draft of heated air accompanying the fire carries quantities of burning embers far in advance. The most destructive fires occurring in New York State in the past have been crown fires.

Ground fires usually originate from surface fires burning over areas of soil bearing high percentages of vegetable matter. They can occur only when the soil is dried sufficiently to permit combustion. Because of the water-retaining qualities of humus soil, such fires occur in New York State only following periods of drought, usually in late summer or fall. Ground fires smolder. They will travel a considerable distance under ground and may appear on the surface at any time to form a surface fire. They will burn deep into the ground and can be extinguished only with difficulty. Where possible, water is the best medium to accomplish this, although where the soil is shallow they may be stopped by a trench dug through the vegetable soil and entirely surrounding the burning area. The tenacity of ground fires is illustrated by the fact that such fires having started during the fall have been known to burn in our Adirondack areas through most of the winter under a covering of a deep layer of snow.

Surface fires are in the aggregate the most destructive class of fires occurring in this State and it is with such fires that the public are most familiar. The surface fire is the important fire to prevent as its unrestricted development may end in ground or crown fires. Several factors, such as the amount and kind of fuel, topography and climatic conditions, influence the character and extent of surface fires.

Naturally, the greater the amount of dead vegetation available for fuel, the more intense the fire. Areas of dry grass, weeds and brush form an ideal source of fuel for surface fires. Where dense grass or brush areas are in isolated spots with no intervening inflammable material there is little danger that a fire will

Courtesy of Conservation Department

In Contrast with the Preceding Photograph, This Shows the Ravages of Fire and also the Line Where the Fire Was Stopped

gain headway. On the other hand, where large fields of uncut grass or extensive areas of heavy weed or brush growth exist, any fire that starts will be severe. A fire spreads rapidly uphill, aided by the heated air currents, and slowly downhill. High winds accompanied by low humidity result in increasing the rate of spread and intensity of any fire; and high humidity or moist air, and the absence of wind frequently result in the fire burning itself out or dying down. Such a condition exists during the night, making it the most suitable time for fighting fire.

It is extremely difficult to extinguish a rapidly spreading brush or forest fire. Frequently back firing or burning back from an existing barrier where the fire may be controlled toward the main fire, is the only feasible method, but it should be undertaken only by an experienced person. Small fires may be beaten out. A wet burlap sack is excellent, but a limb from a hardwood tree or a broom will serve in an emergency. Sand or light loamy soil thrown on the fire will stop its progress. Water, however, is probably the best agent.

In many sections of New York State, forest and brush fires and even grass fires have always been of such common occurrence that there is a local feeling that they can not be prevented. Efforts should be made to extinguish brush and grass fires immediately upon their occurrence rather than delay until they menace valuable property, as a small fire may be easily extinguished whereas the same fire permitted to burn a few hours may tax a modern fire department to the limit in preventing destruction of buildings in its path. Fires that have escaped from control may frequently be headed in directions away from buildings or toward fire barriers by attacking the sides of the fire. Cleared lanes, formed by raking out all inflammable material, make suitable fire barriers, and one or more plowed furrows are of great assistance.

The risk from fire can not be entirely eliminated. In the forests there will always be inflammable material, which at certain times of the year is easily ignited. Brush land presents a similar picture of fire danger, and all of us are familiar with the rapidly spreading fires that result when grass land is ignited in the early spring. While fires can not be eliminated they may to a large extent be prevented, and the resulting damage reduced. The danger of fires in grass, brush or forest land should be eliminated as far as possible by preventing the existence of the causes of fire. The more common causes of fires may be grouped under the following headings: careless smokers, camp fires, burning of brush and débris, and burning over grass land. In New York State more than 80 per cent of our fires may be attributed to these causes. Education of the public to the necessity of forests and the needless losses resulting from brush and grass fires is necessary before any success may be achieved in eliminating the fires resulting from carelessness and ignorance. Laws exist in this State that will accomplish all that may be accomplished by statute, but there must be public support.

Smokers' fires, originating along our highways and trails, occur each year in increasingly large numbers. These fires result from the careless disposal of burning matches or tobacco, usually in the form of cigarettes. It is a natural but costly habit for a smoker to throw this material from him. During periods of fire danger, it is almost impossible to prevent such smoking material from falling into dry inflammable grass or leaves. Until the smoker can be induced to extinguish thoroughly his matches, preferably by breaking them between the fingers, and extinguish thoroughly all burning tobacco, fires from this source will continue in increasingly large numbers.

Courtesy of Conservation Department

Modern Steel Observation Tower from Which Forest Fires Are Located

Courtesy of Conservation Department

Results of Permitting a Fire To Escape beyond Control. Standing Stubs Indicate Size of Forest Growth before Burning

Campers, fishermen and hunters as a class are responsible for too many of our fires because of their ignorance of the proper manner of building fires for cooking or warmth, and their failure to extinguish these fires. Fires originating from this cause are frequently in the more inaccessible areas. Camp fires should be built only on mineral soil or preferably on rock. The surface of the soil in our forest land is composed of much organic material which will ignite when dried out by a camp fire. Such soil will hold a smoldering fire for long periods before it will develop sufficient heat to burst into flames. Many camp fires escape from control because the close proximity of kindling or heavier fuel permits direct ignition from the burning camp fire. Lastly and most important, camp fires should never be left burning. A good camper will always see that the ashes of his camp fire are cold before he leaves. The use of water is the only certain manner to accomplish this.

Fires caused by burning brush, refuse or grass land are of too frequent occurrence. A period when there is no wind should be chosen for the burning of brush or refuse, which, if possible, should be placed in receptacles that will confine the embers. In addition, all inflammable material should be removed from around the fire and the blaze should be carefully watched until the last ember is out, not just smoldering. A light breeze will fan the embers to flame and distribute them into dry grass.

Because of high humidity and the usual absence of high winds, the best time for burning brush and refuse is immediately following a rain or during the late afternoon or evening. Too much emphasis can not be given to the necessity of taking greater care with fire in the vicinity of brush or grass land.

When it is necessary to burn extensive areas of grass, it is essential that such burning be undertaken only during a period when the fire is not likely to escape from control and it should be confined to small areas until the entire burning is completed. This may be accomplished by permitting the fire to burn toward the wind rather than with the wind. In this way there is a minimum chance that the fire will escape from control as it is not burning with sufficient rapidity to prevent its being extinguished. There should also be sufficient men with suitable tools available to extinguish the fire if the necessity arises.

A real desire on the part of the public to reduce the risks existing on their property and to act as missionaries in spreading the gospel of fire prevention will greatly reduce the occurrence of our forest and brush fires. Past experience has proved that the destruction resulting from these fires may be reduced to a minimum. There is no secret to the formula. Its foundation is a mass desire to prevent fire loss by reasonable precautions when using fire in the open, and a united effort to extinguish all fires as soon as they get into brush or grass land and before they attain sufficient size to jeopardize valuable property.

Success may be achieved in the Arbor Day program of the "planting, protecting and preservation" of our forests only after forest fires have been eliminated or the resultant losses reduced to reasonable limits. Use care with fire in the woods.

"Prevent Forest Fires, It Pays."

New York's Victory Over the Gipsy Moth

BY JOHN T. GIBBS, SECRETARY, NEW YORK STATE CONSERVATION DEPARTMENT

In 1868 it was noticed that a new variety of insect, probably imported on growing plants from Europe, was eating the leaves off a rather large number of trees in Massachusetts. In a very short time a fairly large area was infested; trees were first retarded in their growth and then died after an interval of a few years. After several years this insect was identified as the gipsy moth. Some trees were sprayed but no concerted effort was made to eradicate the pest, so that its area of damage spread not only widely through Massachusetts, but up into New Hampshire and Vermont and down into Rhode Island and Connecticut.

It was not until 1890 that Massachusetts undertook a campaign of eradication which continued for ten years. This campaign made considerable progress but the spread of the moth was not checked. Superficially, however, it appeared that the pest was diminishing so that in 1900 the work was discontinued. The following five years, however, saw an alarming spread of the moth and all the New England states in 1905 made appropriations for its attempted eradication, followed in 1906 by the Federal Government.

During all this period the State of New York had no interest in the campaign, as the area of infestation moved at about the rate of six miles a year and no trace of the pest was found in this State. There was, however, a slow movement westward through Massachusetts and Connecticut and the threat was gradually approaching the New York border.

The first sign of the moth in New York, strangely enough, was found in Geneva in 1917. Apparently the eggs of the insect had been carried far into the middle of this State upon

Courtesy of Conservation Department

Spraying Trees To Kill the Gypsy Moth

produce from New England and had found a host in trees in that district. These trees were promptly sprayed and the pest was eradicated from the district, but in 1919, two larger areas of infestation were found on Long Island. Prompt measures also succeeded in preventing a spread there, but two more small outbreaks in Westchester and Schenectady counties in subsequent years convinced the authorities here that the time had arrived when New York must do something.

It was not until 1922 that the great area of infestation reached the New York border. Trees in Massachusetts and Connecticut only a few miles across the State line began to show the result of the moth's ravages, so New York determined once and for all to keep the pest out of this State.

In 1923 the Legislature made an appropriation of $150,000 to fight the gipsy moth, and entrusted the Conservation Department with the duty of keeping the State free from this menace to its woodlands. Previously the Department of Agriculture and Markets had done such minor preventive and eradication work as was necessary, but now it was the task of the Conservation Department to formulate a campaign to save this State forever from this danger.

Immediately the State set up a barrier zone between the Hudson river and the line separating New York from the New England states. Across the line another strip of the zone was maintained in three states by the Federal Government. In this zone, into which it was expected that the moth would naturally spread, intensive eradication methods were set up. Each summer crews of men were sent through the zone, looking for traces of the moth's work and spraying all infested trees with a solution of arsenate of lead, which killed all the moths. Each fall and early winter other crews literally

combed the wooded areas, searching for egg clusters. Whenever found, they were painted with creosote, which instantly killed all life in the eggs.

For ten full years this work has been going on. Each summer there swarms over from New England a new cloud of moths, beginning to eat the leaves off our trees and then laying their eggs. But each summer, wherever colonies are detected in the barrier zone, they are wiped out and each winter those which survived long enough to lay eggs are prevented from multiplying when their eggs are destroyed.

By these methods the State of New York has been absolutely protected from the gipsy moth. For ten years New York has been annually threatened and the enemy annually repulsed. Each year new colonies from New England are found, but each year they are wiped out. At no time in the entire decade has any colony been allowed to spread so as to form an infested area. Thousands of colonies have settled here, but not one has survived long enough to spread.

The victory has been complete. Even in the barrier zone only small patches of trees have been damaged by the moth. There is no widespread or even large devastation among New York's trees by the insect.

The westward march of the pest has been definitely checked. If New York had not established its barrier zone in 1923, by this time the entire Adirondack and Catskill areas would have been centers and hives of infection. As it is, not a single acre of Adirondack or Catskill forest has been ravaged. The moth would have spread over Long Island and into New Jersey and across the Catskills into Pennsylvania, but these two states, while they have had infested areas of their own from other sources, have not had a single outbreak which could be blamed on migrants from New York.

In fact, the whole country has New York to thank for preventing the westward progress of the pest. Certainly, if New York had not adopted and maintained strictly its barrier zone, the moth would eventually have marched swiftly through Pennsylvania and from there would have gone both south and west.

The Legislature of New York has never wavered in adherence to its policy of financing adequately this campaign. During the entire ten years it has maintained an average appropriation of $150,000 annually, which has just been sufficient to keep up the force which prevents the entrance of the pest into the State.

This has been $1,500,000 well spent. In all probability it has saved $10,000,000 worth of the State's trees from destruction, and that is putting the saving at a very conservative figure. The loss in New England due to the ravages of the gipsy moth have far exceeded $10,000,000, and each year the New England states are spending as much as New York spent in the entire ten years in order to save their trees from still further damage.

Here is a splendid achievement of which New York's legislators and foresters may well be proud. At the same time their sympathy must go forth to New England, which was attacked and its trees desolated at a time when scientific knowledge did not permit effective methods of combating the pest and when modern ideas of a state's duty to protect the public from such dangers did not prevail.

The State of New York, of course, can not claim all the credit for fighting the pest. Earnest and remarkable work has been going on for years in New England financed both by the states and the Federal Government and it was by adopting the methods developed in the earlier field by others that New York was able to accomplish so much. Had not considerable eradication work been done in New England, undoubtedly New York would have been forced to spend twice or thrice as much in its barrier zone to keep out the moth. Indeed, New York's task has been made considerably easier by New England's stubborn fight against greater odds than were ever met here.

A word as to what the moth does. Unlike some other pests, it is not particular in its diet. With a few exceptions it eats the leaves of all varieties of trees, coniferous and deciduous alike. That makes it all the more dangerous, as it will march through a grove or forest destroying everything. The moth attacks only the leaves, but that is enough, as defoliation definitely retards growth and eventually kills any tree.

New York, therefore, has every reason to be thankful that the moth was late in reaching this State and that its authorities were prompt and generous in checking it before it was able to do any damage.

Allegany School Offers Natural History Courses

The Allegany School of Natural History will conduct its seventh session beginning July 5th and ending August 24th. The school is located in the Allegany State Park south of Salamanca and is the only outdoor school of its kind in the State where work of college grade is given in the woods.

The school was established to meet the need for outdoor study and training in the study of natural history. The central principle of instruction is to guide the student in personal observation in the field, in studies in the laboratory and in reading with a view to enabling him to develop powers of observation, thought and judgment.

Field courses are given in botany, zoology, geology, birds and nature study. In addition, the facilities of the school are available to a limited number of advanced students and specialists who wish to pursue researches appropriate to the region.

The school is conducted by the Buffalo Society of Natural Sciences in cooperation with the New York State Museum and is affiliated with the University of Buffalo, which gives college credits for courses taken at the school.

Registration should be completed before June 15th. Application should be made to Dr Robert B. Gordon, Ohio State University, Columbus, Ohio. A circular of information gives full details as to equipment needed by each student. The cost of tuition, board and lodging is $150 for the session.

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